

REMARKS

In the present Office Action, claims 1-14 were examined and all examined claims stand rejected. By this Amendment, claims 1 and 9 have been amended. No claims have been canceled and no new claims have been added. Accordingly, claims 1-14 are presented for further examination. No new matter has been added. By this Amendment, claims 1-14 are believed to be in condition for allowance.

The Examiner requested restriction between the claims of Group I (claims 1-14) drawn to a laser ablation resistant copper foil and classified in class 428, subclass 607 and the claims of Group II (claims 15-20) drawn to a method for manufacturing a printed circuit board and classified in class 216, subclass 65. On October 19, 2004, Applicants' attorney made a provisional election to prosecute the claims of Group I. Applicants affirm the election of Group I and traverse the restriction requirement.

Applicants acknowledge that the copper foil embodied in claim 1 may be formed into a printed circuit board by a method other than that embodied in claim 15 and may also have applications other than in a printed circuit board. However, the method embodied in claim 15 contains a specific step (b): lamination of the laser ablation resistant foil of claim 1 onto a first side of a dielectric substrate. Accordingly, any search of the method steps of claim 15 would necessarily include a search of the copper foil embodied in claim 1. Therefore, the search of the two groups of claims is at least partially co-extensive and the Examiner would not be unduly burdened to consider all claims on their merits at the same time.

Removal of the Restriction Requirement and consideration of all pending claims on their merits is respectfully requested. If the Examiner repeats the restriction requirement and makes it Final, Applicants reaffirm the election of the claims of Group I, claims 1-14.

The paragraph beginning at page 1, line 16 of the Specification has been amended to remove an extraneous closed parenthesis and to correct an error in grammar.

Claims 1 and 9 were objected to as containing an informality. The Examiner considered the expression "FR-4" as vague and indefinite. FR-4 has been amended to read fire retardant, fiberglass reinforced, epoxy in accordance with Applicant's specification at

page 1, lines 25-26 and page 8, lines 243-244. With this amendment, the claim objection has been rendered moot.

Applicant's invention, as embodied in claim 1, is drawn to a copper foil intended to be laminated to a dielectric substrate. As noted in Applicants' specification at page 1, line 31, one requirement of such a foil is good adhesion to a dielectric substrate. As disclosed in Applicants' specification at page 2, line 67, a second requirement is the ability to form a blind via by laser ablation. By coating the copper foil with a laser ablation inhibiting layer having an average surface roughness within the range of 0.4 micron and 0.7 micron, the dual objectives of a high peel strength and laser ablation resistance are achieved. It is respectfully solicited that none of the references of record, either alone or in combination, teach or suggest a copper foil having the combination of a high peel strength and resistance to laser ablation. Applicants' claims should be allowed over the cited combination of references.

Claims 1-14 were rejected under 35 U.S.C. 103(a) as unpatentable over Chen, et al. (U.S. 5,800,930) in view of Yamanishi, et al. (U.S. 5,389,446), Ameen, et al. (U.S. 6,132,589) or Poutasse, III, et al. (U.S. 5,622,782).

The Chen, et al. reference, which is commonly owned with the present application, discloses a nodular copper/nickel electrodeposited layer having a dark color. The nodular height is disclosed to be in the range of 0.5 micron to 3 microns. Contrary to Applicants' treatment, the treatment disclosed in Chen, et al. enhances laser ablation rather than inhibits it. Reference is made to Applicants' specification at page 11, line 342, where it is disclosed that a dark oxide coating enhances laser ablation. Note also Applicants' specification at page 10, lines 324-329 where it is disclosed that a low surface profile, an average surface roughness of less than 0.7 micron, is required to enhance stopping of the laser at the backside of second copper foil layer. There is nothing in Chen, et al. to teach or suggest applying a coating with a relatively low average surface roughness.

In view of the Chen, et al. disclosure of a dark color for the nodular coating layer, and the recognition that this dark color would enhance laser ablation rather than inhibit it, the Chen, et al. reference neither teaches nor suggests, either alone or in combination with the other cited references Applicants' invention. Rather, the Chen, et al. reference is a teaching away from Applicants' invention that is drawn to a laser ablation inhibiting coating layer applied to a copper foil.

For the 35 U.S.C. 103(a) rejection, the Chen, et al. reference was combined with any one of the following three references. It is noted that none of the three references teach or suggest forming a laser ablation inhibiting coating on a copper foil and Applicant's claims should be allowed over any of the cited combinations of references.

Yamanishi, et al. disclose a copper foil having a roughened side and a shiny side. The foil is coated with a mixture of nickel, chromium oxide and zinc or zinc oxide. There is nothing in the reference to teach or suggest forming a coating layer having a minimum average surface roughness of 0.4 micron as required for a suitable peel strength to prevent delamination of the foil as disclosed in Applicants' specification at page 10, lines 330-331.

Ameen, et al. disclose a copper foil coated with zinc oxide followed by hexavalent chromium oxide, followed, optionally, by a silane coupling agent. There is nothing in the combination of references to teach or suggest a coating layer having a roughness effective for both laser ablation inhibition and forming a suitable peel strength to prevent delamination of the copper foil.

Poutasse, III, et al. disclose a copper foil coated with a duplex silane composition used as an adhesion promoting layer. There is nothing in the combination of references to teach or suggest a coating layer effective to inhibit laser ablation of the coated foil.

Applicants' claims are neither taught nor suggested by any of the cited references either alone or in combination. The amended claims should be allowed over any combination of cited references.

Accordingly, Applicants submit that none of the references, alone or in combination, anticipate or make obvious the invention as presently claimed and that the application is now in condition for allowance. Therefore, Applicants respectfully request reconsideration and further examination of the application and the Examiner is respectfully requested to take such proper actions so that a patent will issue herefrom as soon as possible.

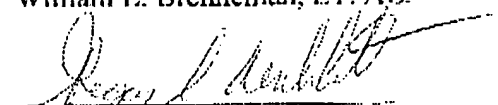
If the Examiner has any questions or believes that a discussion with Applicants' attorney would expedite prosecution, the Examiner is invited and encouraged to contact the undersigned at the telephone number below.

10,777,940
9 of 9

Please apply any credits or charge any deficiencies to our Deposit Account No. 23-1665.

Date: February 4, 2005
Reg. No. 32,489

Respectfully submitted,
William L. Brennenman, ET. AL.



Signature of Attorney
Gregory S. Rosenblatt
WIGGIN & DANA LLP
One Century Tower
New Haven, CT 06508-1832
Telephone: (203) 498-4566
Facsimile: (203) 782-2889

\\10070\2005\513440.2